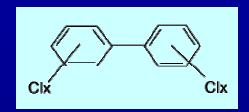
PCB Monitoring

for the

Development of the Upper Tidal James River TMDL



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Meeting Overview - PCBs

- Background
 - Why important?
- Legacy Pollutant
- Spring 2009 Study
- TMDL Development/
 Challenges
- PCB Point Source Guidance







VA Regulatory Criteria Total PCBs

Consumption
Advisories
Fish Tissue
(ppb)

Water Quality
Criterion
(ppb)

(Awaiting final approval from EPA)

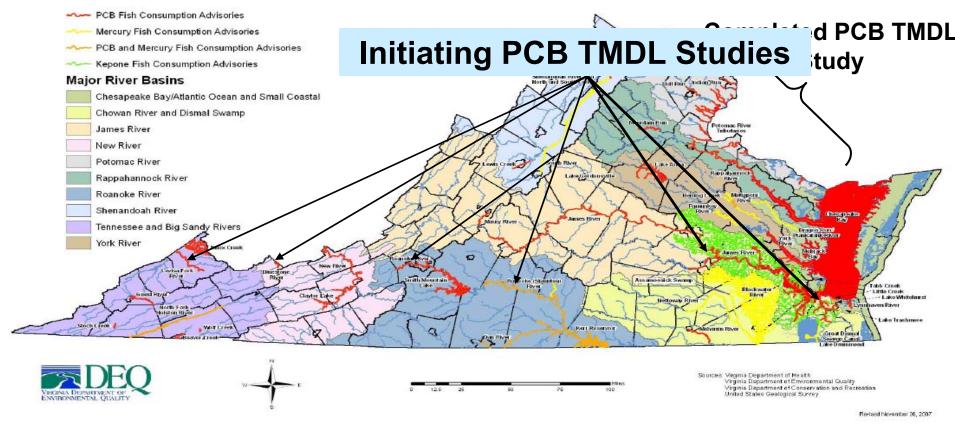
50 0.00064

-WQC represents concentration in water column where accumulation of PCBs in fish should be at a level protective of fish tissue for consumption (humans)

Problem Identification - Fish Consumption Advisories -

Waters Under VDH Fish Consumption Advisories

Identified in 2008 305(b)/303(d) Water Quality Integrated Report



VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

James River Fish Consumption Advisory (VDH)

- I-95 bridge in Richmond downstream to Hampton Roads Bridge Tunnel
 - Includes Appomattox R., Bailey Crk,
 Poythress Run, Bailey Bay, etc.

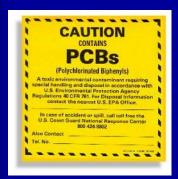
Fish Species	Advisory
Gizzard Shad, Carp, Blue Catfish & Flathead Catfish ≥ 32 inches	Do Not Eat

Blue Catfish & Flathead Catfish < 32 inches, Channel Catfish, White Catfish, Largemouth Bass, Bluegill Sunfish, American Eel, Quilback Carpsucker, Smallmouth Bass, Creek Chub, Yellow Bullhead Catfish, White Perch, Striped Bass, Hickory Shad

No more than two meals/month

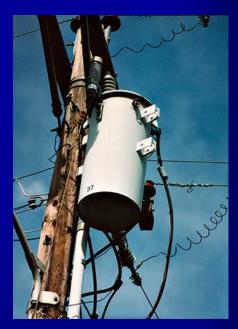






PCBs

- Estimated that > 1.5 Billion lbs. manufactured in the U.S. until 1977 - "Legacy Contaminant"
- Very stable and heat resistant
 - Persistent in environment
- Common uses:
 - Transformers, capacitors, hydraulic fluids, circuit breakers, PVC Products, carbonless copy paper, caulking material, paints, etc.



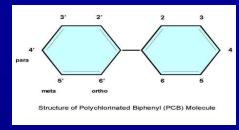




PCBs – What are They?





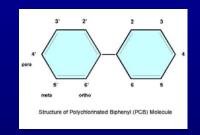


- 209 distinct PCB Compounds
- Regulated by VADEQ as Total PCB (tPCB)
 - = 209 compounds summed
- Referred to as PCB Aroclors (Monsanto tradename) = mixture of PCB compounds



PCBs – Why Important?

- Bioaccumulates at low conc. (lipids)
- Suspected carcinogen
- Other toxicological effects (humans)
 - Immunotoxicity, reproduction and developmental, hepatotoxicity (liver), neurotoxicity, and chloracne



- Major Sources of Exposure (humans)
 - Consumption of contaminated fish
 - Inhalation (dust from contaminated sites)



PCBs - A Legacy Pollutant?

- Banned in late 70's
- Accumulate and persist in river sediments from historic releases
 - "Hot Spots"
- Generally not detected under VPDES Program





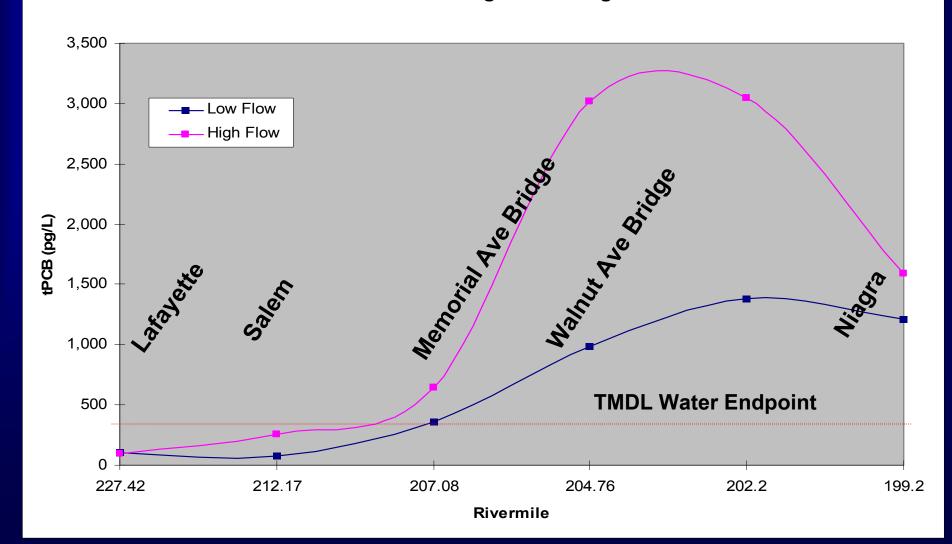
PCBs – Current Releases?

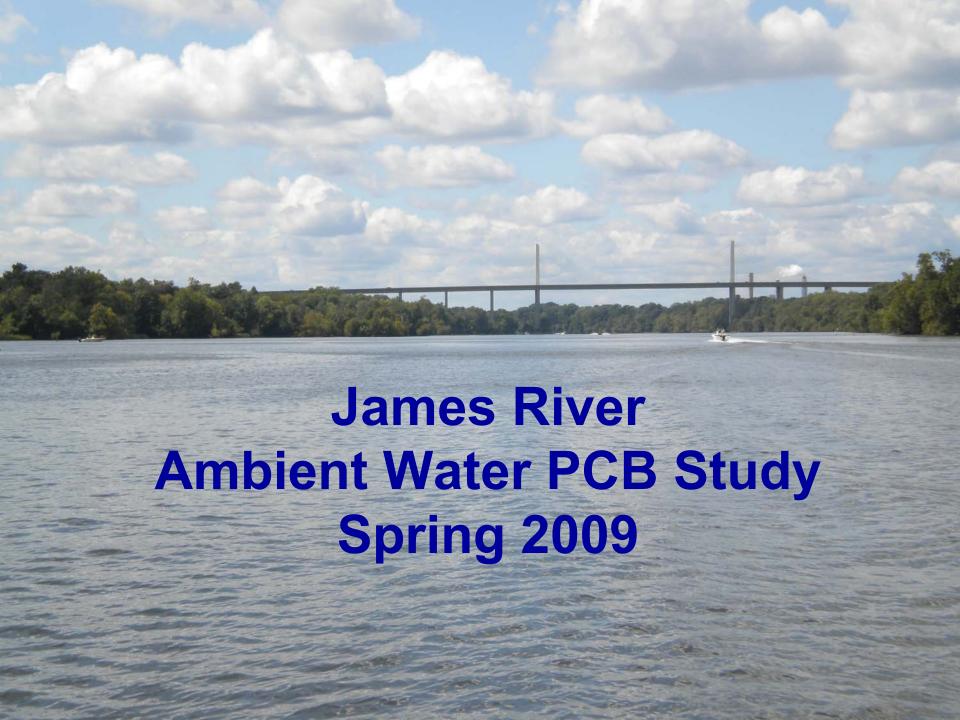
- PCBs used many years after banned
- Contaminated sites with active transport (non-point - e.g., CERCLA, RCRA, VRP, unknown)
- Dielectric oils considered non PCB < 50 ppm
 - Fish advisories at 0.05 ppm
- Inadvertent production
 - Carbon + heat + chlorine
- Atmospheric
- Point Sources



Roanoke River tPCBs - Event Driven Releases -

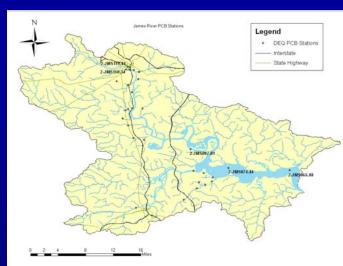
Total PCB concentrations (pg/L) in ambient water collected from the upper Roanoke River during low and high flows





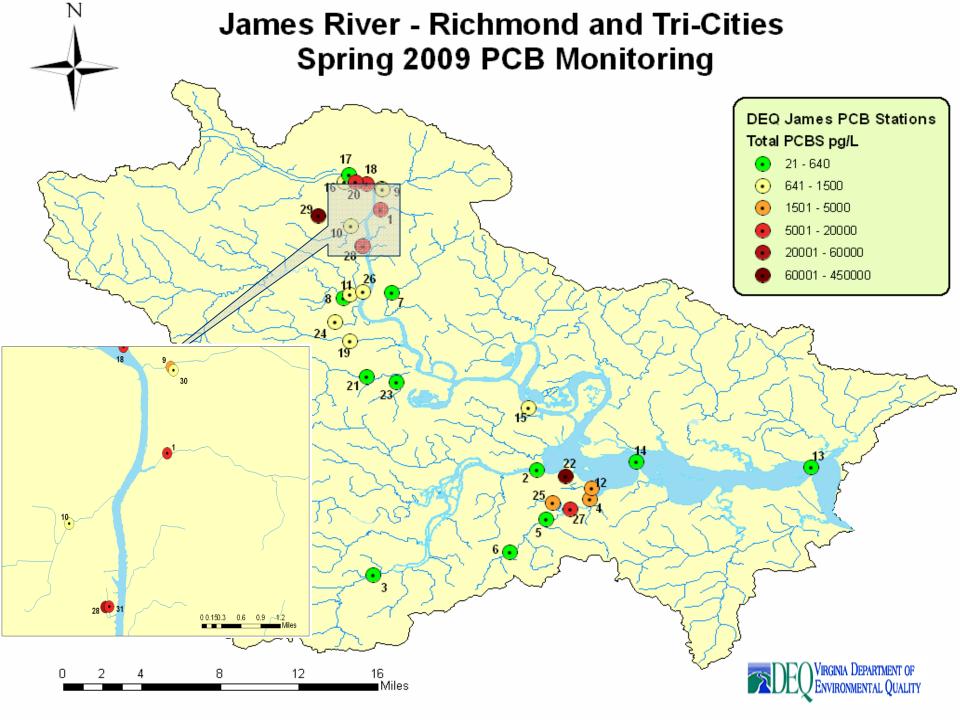
PCB Water Study

- Water samples collected April – June 2009
- Targeted wet and dry weather
- Used EPA Method 1668 for analysis
 - Low level detection method









DEQ JAMES RIVER BASIN SPRING 2009 PCB SAMPLING LOCATIONS AND RESULTS (METHOD 1668B)									
LEGEND#	STATION ID	STATION DESCRIPTION	STREAM NAME	TOTAL PCBS (pg/L)	AVG OF 2 SAMPLES				
1	2-ALM000.42	Almond Creek at Rt. 5 bridge	ALMOND CREEK	5290	NO				
2	2-APP001.53	BUOY 8 (CITY OF HOPEWELL)	APPOMATTOX RIVER	245	NO				
3	2-APP012.79	RT. 36 BRIDGE	APPOMATTOX RIVER	398	NO				
4	2-BLY000.65	RT. 10 BRIDGE	BAILEY CREEK	4091	NO				
5	2-BLY003.42	BAILEY CREEK, RT. 156 BRIDGE	BAILEY CREEK	333	NO				
6	2-BLY005.73	RT. 630 BRIDGE BELOW FORT LEE	BAILEY CREEK	300	NO				
7	2-CEL001.56	Cornelius Creek at Mill Road	Cornelius Creek	21	NO				
8	2-FAC000.85	Falling Creek at RT. 1 BRIDGE	FALLING CREEK	203	NO				
9	2-GIL000.42	Gillie Creek at Williamsburg Ave. BRIDGE	GILLIE CREEK	2936	NO				
10	2-GOD000.77	GOODE CREEK, COMMERCE ROAD	GOODE CREEK	965	NO				
11	2-GRK000.35	Grindall Creek at Station Road	Grindall Creek	970	NO				

Gravelly Run

JAMES RIVER

JAMES RIVER

JAMES RIVER

James River, Middle

James River, Middle

Kanawha Canal

Kingsland Creek

Manchester Canal

PROCTORS CREEK

Poythress Run

Redwater Creek

Unnamed tributary to James

UT to Cattail Creek (CTC)

UT to UT (XNU) to James

UT to Bailey Cr

NULL

DITCH SOUTHEAST OF

NELSON ELECTRIC

RICHMOND CITY CSO #028

SIMSCR

1684

492

214

1413

843

589

17993

976

5061

130

233484

462

704

3952

1012

8770

37760

434768

6988

NO

NO

NO

NO

NO

NO

NO

YES

NO

NO

NO

NO

NO

NO

NO

NO

YES

NO

YES

VIRGINIA DEPARTMENT OF

ENVIRONMENTAL QUALITY

Gravelly Run 15 m above mouth at JMS

WINDMILL PT, BUOY 86

RT. 156 BRIDGE BELOW HOPEWELL

BUOY 137

SOUTH BANK OF THE JAMES RIVER BELOW FALL

NORTH BANK JAMES RIVER BELOW FALL ZONE R

James R & Kanawha Canal @ Pear Street

Kingsland Creek at Rt. 1

Manchester Canal DS Stockton StCSO 014

Proctors Creek at RT. 1 BRIDGE

Poythress Run at Station Str, Hopewell

Redwater Creek at Rt. 615, Coxendale Rd

UT to James R (No Name Cr)

UT to Cattail Cr off S 1st Ave @ culvert

East Cr below Dupont Sp pond at USS I-95

UT Bailey Cr, aka Bear Cr 0.9mi US Rt 10

Kinder Morgan pond next to Sims Metals

Ditch below Nelson Electric OW Separator

RICHMOND CSO 28 to Gillies C, Wmsburg Rd

South channel draining Sims Metals

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

2-GRV000.01

2-JMS066.88

2-JMS074.44

2-JMS087.01

2-JMS110.34

2-JMS110.44

2-KAN000.03

2-KSL002.62

2-MAN000.19

2-PCT002.46

2-PTH000.42

2-RDW000.50

2-XSZ002.04

2-XYO000.03

2-XYS000.15

2CXAN000.08

KMPOND

NELSON EL

DITCH

RICHMONDCSO-

028

SIMSCR

Questions?



Components of TMDL Study

Fish Consumption Advisory Identify Problem Initiating Source Assessment **Method 1668** Low Level PCB Identify sources Analysis Estimate source loading Link Sources to Targets Assess linkages Estimate total loading capacity TMDL Allocations Reduce loads from sources Divide remaining loads among sources

TMDL = Sum of WLA + Sum of LA + MOS



TMDL Source Assessment - Categories-

- Point Sources
 - WWTPs, Industry, Industrial SW, CSOs



- MS4
- Non-Regulated Stormwater (Direct Drainage)
- Contaminated Sites
- Atmospheric Deposition
- River Sediment



Point Sources

- TMDL requirements:
 - Baseline or existing load condition
 - -Waste Load Allocations (WLAs)

```
Baseline PCB = PCB conc. * Ave Flow (mgd) * 1.38
```

```
TMDL = PCB Endpoint conc. | Design Flow (mgd) * 1.38 conc. ng/L
```



Point Sources

- Permitted dischargers generate PCB data under the VPDES Permit Program using EPA Method 608
 - -Typical Comment
 - "PCBs have never been detected in my effluent"
- Why are permitted dischargers being asked to collect additional PCB data?

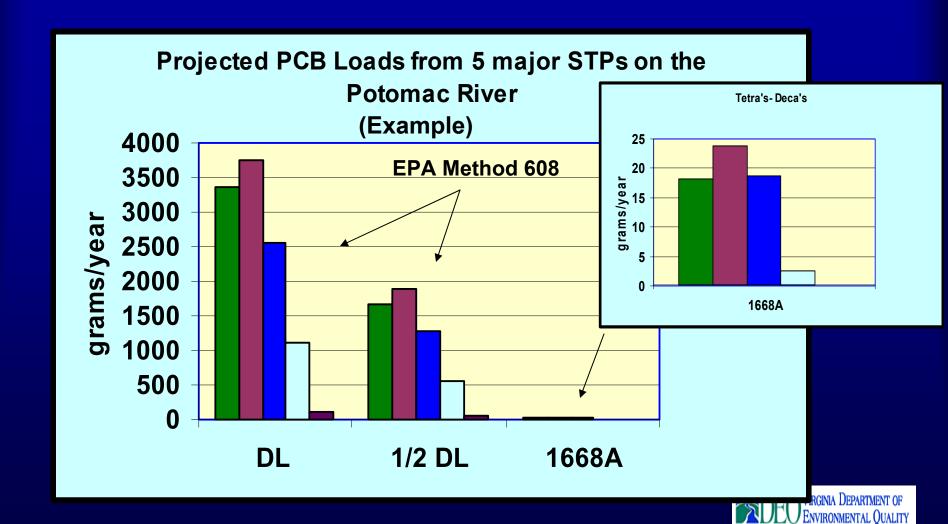


Point Sources TMDL Need - Establish Baseline Loading

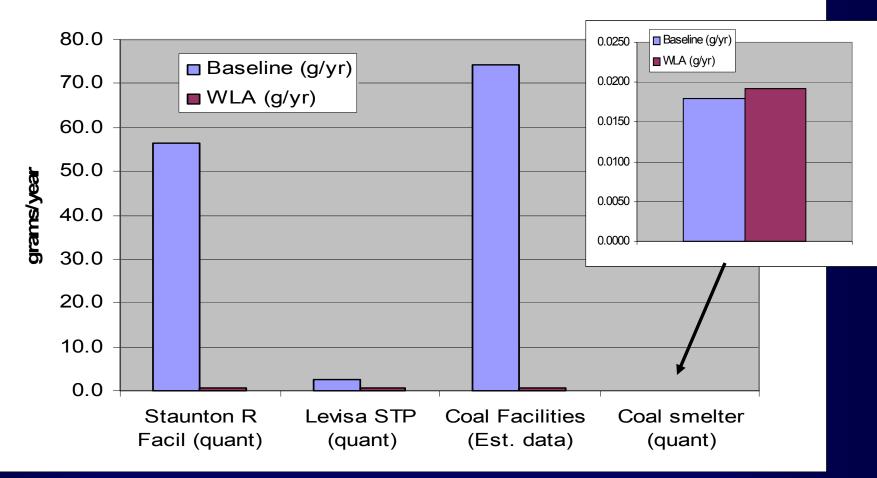
- EPA Method 608 (Permit method)
 - -PCBs rarely detected (MDL = 0.065 μg/L; QL = 0.5 μg/L) tPCB WQC = 0.00064 μg/L
 - Reported as Aroclors
- Options
 - No data = no load?
 - Not an option: existing load required by TMDL
 - Use assumptions (Method QL or DL)
 - Generate low level PCB data



Assumptions vs. Real Data



PCB Load Comparison Between Baseline Condition and the TMDL WLA



Baseline PCB Condition = [PCB conc. ng/L] *Ave Flow (mgd) * 1.38 TMDL WLA = [PCB Endpoint conc. ng/L] * Design Flow (mgd) * 1.38

PCB Analytical Method

- EPA Method 1668, Revision B
 - High Resolution Gas Chromatography/
 High Resolution Mass Spec
 - Analyzes 209 Congeners
 - Detection ≤ 5 pg/L per congener
 - Targets PCB concentrations that are relevant to fish



Questions?



Guidance for Monitoring of Point Sources for TMDL Development Using Low Level PCB Method 1668

March 2009

http://www.deq.virginia.gov/tmdl/pcb.html



Need for PCB Monitoring Guidance

- All areas of the Commonwealth lacking PCB water data (ambient and effluent)
- DEQ has insufficient funding to perform PCB analysis for TMDL source categories
- Asks permit holders to generate the data
 - Provides a consistent, technical approach
 - Enables DEQ to focus on performing ambient water and sediment PCB analysis
 - Used for source assessment
 - Model fate and transport of PCBs



Point Source PCB Monitoring Guidance

Purpose is to establish procedures for implementing point source monitoring of PCBs in support of TMDL development.

Originated from data needs on the Potomac PCB TMDL. Similar to efforts used in New York (Panero et al., 2005), Delaware and New Jersey (DRBC 1998)

http://www.nyas.org/programs/harbor.asp

http://www.state.nj.us/drbc/regs/pcb-new.pdf



Guidance Developmental History

2006 - DEQ Internal Development 2007 thru 2008 -

Technical Advisory Committee: Bluefield STP, City of Richmond, Dominion Resources, DCR, DMME, HRPDC, Navy, Southern Environmental Law Center, UOSA, U.S. Fish & Wildlife, VWMA, VMA, Western VA Water Authority (6 meetings)

DEQ Internal Review (ongoing)

EPA Region III review (Fall 2008)

2009 - Finalized



Guidance Document

- I. Introduction
- II. Background
- III. Authority
- IV. Definitions
- V. Procedure
 - A. Facilities identified for monitoring
 - B. Monitoring frequency
 - C. Sample collection and analytical requirements
 - D. Analytical laboratories
 - E. PCB reporting requirements
 - F. References
- VI. Appendices



Facilities Identified by Regional Office for PCB Monitoring

- Major (including CSOs) & minor municipals
- Industrial facilities (specific SIC codes)
- Industrial stormwater dischargers under individual or general permits (SIC codes)
 - Exemptions (case by case basis)
 - Minor municipals document not a source
 - SW through a POTW or CSO or "no exposure"
 - Representative or identical outfalls
 - DEQ does not regulate MS4s
 - Provides framework for PCB monitoring



Monitoring Frequency

Base flow (dry) and storm flow (wet) needed for load characterization

VPDES Facility							
Muni	cipals	Industrials					
Major ≥1 MGD	Minor < 1 MGD	Process wastewater only	Process wastewater with storm water	Storm water only			
2 wet + 2 dry	1 wet + 1 dry	2 samples (storm event sampling not required)	1 dry + 1 wet	2 wet			



PCB Guidance Appendices

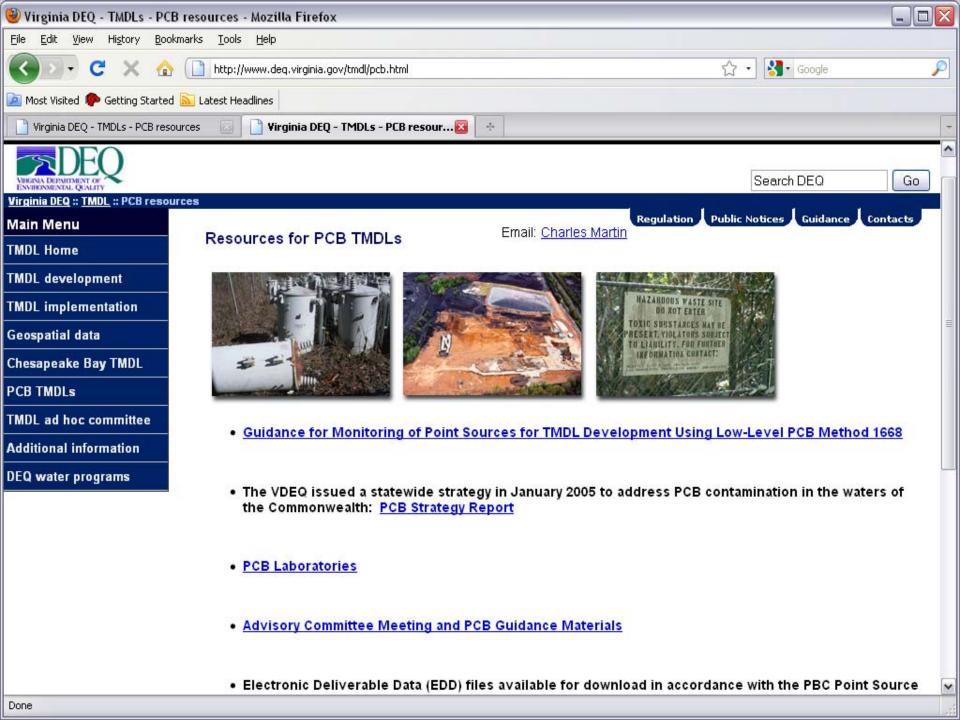
- Appendix C
 - Sampling options & "clean technique" protocol
- Appendix D
 - Analytical Requirements (EPA Method 1668)
 - Approved list of laboratories on website
- Appendix E
 - Data Submittal Requirements



Approved Laboratories

- Lesson learned:
 - If analysis is not performed in accordance with requirements specified in Appendix D, not worth running the analysis
 - Reporting levels not met
- Cost containment
 - Opportunity for partnerships
 - Samples run in batches of 20
 - Samples can be held under the proper conditions up to one year.





Questions?

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